CLAIMS

1.   An encoding device for encoding a plurality of pieces of position information corresponding to a plurality of leaves and/or nodes at the same layer in a tree structure, comprising:

   rearranging means for rearranging, in accordance with a predetermined order relationship, the plurality of pieces of position information to be encoded,

   determining means for determining, in accordance with the predetermined order relationship, a branch layer of two consecutive pieces of position information from among the plurality of pieces of position information output from the rearranging means, and

   encoding means for outputting a code corresponding to the branch layer.

2.   An encoding device for encoding a plurality of pieces of position information corresponding to a plurality of leaves and/or nodes at the same layer in a tree structure, the plurality of pieces of position information to be encoded being arranged in accordance with a predetermined order relationship, comprising:

   determining means for determining, in accordance with the predetermined order relationship, a branch layer of two consecutive pieces of position information from among

the plurality of pieces of position information to be encoded, and

encoding means for outputting a code corresponding to the branch layer.

3. The encoding device according to claim 1 or 2, wherein the plurality of pieces of position information are rational number position information represented by a rational number, and wherein the predetermined order relationship is determined by the order of magnitude of resolution of the rational number.

4. An encoding device for encoding a plurality of pieces of position information corresponding to a plurality of leaves and/or nodes at the same layer in a tree structure, comprising:

incremental width determining means for determining an incremental width of the value of the position information based on the plurality of pieces of position information to be encoded,

incremental width encoding means for encoding the incremental width and outputting the encoded incremental width,

determining means for determining a branch layer of two consecutive pieces of position information from among the plurality of pieces of position information to be

encoded, and

branch layer encoding means for outputting a code corresponding to the branch layer.

5. The encoding device according to claim 4, wherein the plurality of pieces of position information are rational number position information represented by a rational number, and

wherein the incremental width is determined on a per branch layer basis so that all the plurality of pieces of position information are encoded.

6. The encoding device according to any one of claims 1 through 5, wherein the tree structure represents search information, and wherein the leaves or nodes corresponding to the plurality of pieces of position information to be encoded correspond to elements of the same type contained in the search information.

7. An encoding method for encoding a plurality of pieces of position information corresponding to a plurality of leaves and/or nodes at the same layer in a tree structure, comprising:

a rearranging step of rearranging, in accordance with a predetermined order relationship, the plurality of pieces of position information to be encoded,

a determining step of determining, in accordance with the predetermined order relationship, a branch layer of two consecutive pieces of position information from among the plurality of pieces of position information output in the rearranging step, and

an encoding step of outputting a code corresponding to the branch layer.

8. An encoding method for encoding a plurality of pieces of position information corresponding to a plurality of leaves and/or nodes at the same layer in a tree structure, the plurality of pieces of position information to be encoded being arranged in accordance with a predetermined order relationship, comprising:

a determining step of determining, in accordance with the predetermined order relationship, a branch layer of two consecutive pieces of position information from among the plurality of pieces of position information to be encoded, and

an encoding step of outputting a code corresponding to the branch layer.

9. The encoding method according to claim 7 or 8, wherein the plurality of position information are rational number position information represented by a rational number, and wherein the predetermined order relationship

is determined by the order of magnitude of resolution of the rational number.

10. An encoding method for encoding a plurality of pieces of position information corresponding to a plurality of leaves and/or nodes at the same layer in a tree structure, comprising:

an incremental width determining step of determining an incremental width of the value of the position information based on the plurality of pieces of position information to be encoded,

an incremental width encoding step of encoding the incremental width and outputting the encoded incremental width,

a determining step of determining a branch layer of two consecutive pieces of position information from among the plurality of pieces of position information to be encoded, and

a branch layer encoding step of outputting a code corresponding to the branch layer.

11. The encoding method according to claim 10, wherein the plurality of pieces of position information are rational number position information represented by a rational number, and

wherein the incremental width is determined on a per

branch layer basis so that all the plurality of pieces of position information are encoded.

12. The encoding method according to any one of claims 7 through 11, wherein the tree structure represents search information, and wherein the leaves or nodes corresponding to the plurality of pieces of position information to be encoded correspond to elements of the same type contained in the search information.

13. A decoding device for decoding a string of position information code composed of a plurality of pieces of encoded position information corresponding to a plurality of leaves and/or nodes at the same layer in a tree structure, comprising:

storage means for successively storing decoded position information,

determining means for determining a branch layer of two consecutive pieces of position information based on the position information code, and

decoding means for increasing the value of the position information, stored in the storage means, corresponding to the branch layer by one notch in accordance with a predetermined order relationship.

14. The decoding device according to claim 13, further

comprising rearranging means for rearranging the plurality of pieces of decoded position information in accordance with the order of magnitude.

15. The decoding device according to claim 14, further comprising calculating means for calculating a serial number assigned to each piece of decoded position information, the serial number representing the order of magnitude.

16. The decoding device according to any one of claims 13 through 15, wherein the plurality of pieces of position information are rational number position information represented by a rational number, and wherein the predetermined order relationship is determined by the order of magnitude of resolution of the rational number.

17. A decoding device for decoding a string of position information code composed of a plurality of pieces of encoded position information corresponding to a plurality of leaves and/or nodes at the same layer in a tree structure, comprising:

incremental width decoding means for decoding an incremental width of the value of the position information,

storage means for successively storing the decoded position information,

determining means for determining a branch layer of two consecutive pieces of position information based on the position information code, and

position information decoding means for increasing the value of the position information, stored in the storage means, corresponding to the branch layer by the incremental width.

18.   The decoding device according to any one of claims 13 through 17, wherein the tree structure represents search information, and wherein the leaves or nodes corresponding to the position information to be decoded correspond to elements of the same type contained in the search information.

19.   A decoding method for decoding a string of position information code composed of a plurality of pieces of encoded position information corresponding to a plurality of leaves and/or nodes at the same layer in a tree structure, comprising:

a storage step of successively storing decoded position information,

a determining step of determining a branch layer of two consecutive pieces of position information based on the position information code, and

a decoding step of increasing the value of the

position information, stored in the storage step, corresponding to the branch layer by one notch in accordance with a predetermined order relationship.

20. The decoding method according to claim 19, further comprising a rearranging step of rearranging the plurality of pieces of decoded position information in accordance with the order of magnitude.

21. The decoding method according to claim 20, wherein the rearranging step further comprises a calculating step of calculating a serial number assigned to each piece of decoded position information, the serial number representing the order of magnitude.

22. The decoding method according to any one of claims 19 through 21, wherein the plurality of pieces of position information are rational number position information represented by a rational number, and wherein the predetermined order relationship is determined by the order of magnitude of resolution of the rational number.

23. A decoding method for decoding a string of position information code composed of a plurality of pieces of encoded position information corresponding to a plurality of leaves and/or nodes at the same layer in a tree

structure, comprising:

an incremental width decoding step of decoding an incremental width of the value of the position information,

a storage step of successively storing the decoded position information,

a determining step of determining a branch layer of two consecutive pieces of position information based on the position information code, and

a position information decoding step of increasing the value of the position information, stored in the storage step, corresponding to the branch layer by the incremental width.

24. The decoding method according to any one of claims 19 through 23, wherein the tree structure represents search information, and wherein the leaves or nodes corresponding to the position information to be decoded correspond to elements of the same type contained in the search information.

25. A program for causing a computer to function as the encoding device according to any one of claims 1 through 6.

26. A program for causing a computer to perform the encoding method according to any one of claims 7 through 12.

27. A program for causing a computer to function as the decoding device according to any one of claims 13 through 18.

28. A program for causing a computer to perform the decoding method according to any one of claims 19 through 24.

29. A computer-readable recording medium storing the program according to any one of claims 25 through 28.